

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau

TIPO OHP

. 1 Mai 1 Mai

(43) International Publication Date 29 April 2004 (29.04.2004)

PCT

(10) International Publication Number WO 2004/036254 A1

(51) International Patent Classification⁷:

G01V 1/38

(21) International Application Number:

PCT/GB2003/004476

- (22) International Filing Date: 13 October 2003 (13.10.2003)
- (25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data: 0223845.9

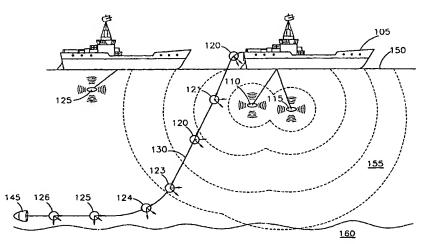
12 October 2002 (12.10.2002) GB

- (71) Applicant (for AE, AG, AL, AM, AT, AU, AZ, BA, BB, BE, BG, BR, BY, BZ, CH, CN, CO, CR, CU, CY, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GR, HR, HU, ID, IE, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, SZ, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW only): WESTERNGECO SEISMIC HOLDINGS LIMITED [—/—]; PO Box 71, Craigmuir Chambers, Road Town, Tortola (VG).
- (71) Applicant (for FR only): SERVICES PETROLIERS SCHLUMBERGER [FR/FR]; 42, rue Saint Dominique, F-75007 Paris (FR).

- (71) Applicant (for CA only): WESTERNGECO CANADA LIMITED [CA/CA]; 24th Floor, Monenco Place, 801 6th Avenue SW, Calgary, Alberta TP2 3W2 (CA).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): MARTIN, James, Edward [GB/GB]; 32 Dunstal Field, Cottenham, Cambridge, Cambridgeshire CB4 8UH (GB). MUYZERT, Everhard [NL/GB]; High Cross, Madingley Road, Cambridge, Cambridgeshire CB3 0EL (GB). ROBERTSSON, Johan, Olof, Anders [SE/GB]; High Cross, Madingley Road, Cambridge, Cambridgeshire CB3 0EL (GB). GOUJON, Nicolas [FR/NO]; Agathe Groendahlsgt 10, N-0478 Oslo (NO). TJOEM, Kyrre [NO/NO]; Schlumberger House, Solbraaveien 23, N-1370 Asker (NO). KEERS, Henk [NL/GB]; High Cross, Madingley Road, Cambridge, Cambridgeshire CB3 0EL (GB).
- (74) Agent: MARKS & CLERK; 4220 Nash Court, Oxford Business Park South, Oxford, Oxfordshire OX4 2RU (GB).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT,

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR DETERMINATION OF AN ACOUSTIC RECEIVER'S POSITION



(57) Abstract: A method and apparatus for determining a position of an acoustic receiver (121-126) are disclosed. The method includes determining a first plurality of acoustic ranges from at least a first signal source position (110) and a second signal source position (115), respectively, to the acoustic receiver (121-126); ascertaining a non-acoustic constraint on the acoustic receiver's position; and determining the acoustic receiver's position from the first and second acoustic ranges and the non-acoustic constraint. The apparatus includes at least one acoustic source (110, 115); an acoustic receiver (121-126), and a computing system. The acoustic receiver is capable of receiving a plurality of acoustic signals transmitted by the at least one acoustic source from at least two signal source positions. The computing system is programmed to determine a position of the acoustic receiver from the acoustic ranges between the at least two signal source positions (110, 115) and the acoustic receiver and a non-acoustic constraint.





- RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.